

SYNERGISM OF SATURN, ENCELADUS AND TITAN AND FORMATION OF HCNO

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Introduction: Saturn as a system has two very exotic moons Titan and Enceladus. Titan with energy input from Saturn's magnetosphere, solar UV irradiation, and cosmic rays can make HCN based molecules as discussed in earlier paper by [1]. Space radiation effects at both moons, and as coupled by the Saturn magnetosphere, could cause an unexpected series of events leading to the evolution of biological models at Titan composed of HCNO with oxygen as the new ingredient. The "Old Faithful" model by [2] suggests that Enceladus, highly irradiated by Saturn magnetospheric electrons, has episodic ejections of water vapor driven by radiolytic oxidation gas products into Saturn's magnetosphere. At Titan Cassini discovered 1) that keV oxygen ions, evidently from Enceladus, are bombarding Titan's upper atmosphere [3] and 2) the discovery of heavy positive and negative ions within Titan's upper atmosphere [4]. Initial models of heavy ion formation in Titan's upper atmosphere invoked polymerization of aromatics such as Benzenes and their radicals to make PAHs [5], while a more recent model by [6] has raised the possibility of carbon chains forming from the polymerization of acetylene and its radicals to eventually make fullerenes. Laboratory measurements indicate that fullerenes, which are hollow carbon shells, can trap the keV oxygen and with the clustering of fullerenes and possible mixture with PAHs, some with nitrogen molecules, can make the larger aerosols with oxygen within them. Then with further ionizing irradiation from cosmic rays deep in the atmosphere "tholin" molecules are produced with all the molecular components present from which organic molecules can form. Among the molecular components are amino acids, the fundamental building blocks of life as we know it. This process maybe a common chemical pathway, both at the system level and at the molecular level, to form prebiotic and perhaps even biotic molecules. Such processes can be occurring throughout our universe, such as molecular clouds in the ISM.

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